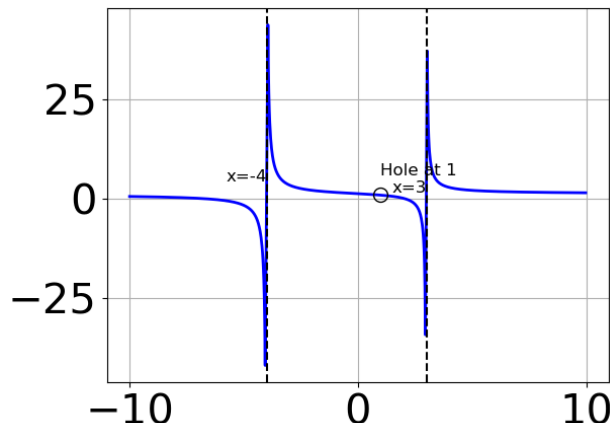


1. Which of the following functions *could* be the graph below?



- A. $f(x) = \frac{x^3 + 10.0x^2 + 11.0x - 70.0}{x^3 - 13.0x + 12.0}$
- B. $f(x) = \frac{x^3 + 4.0x^2 - 19.0x + 14.0}{x^3 - 13.0x + 12.0}$
- C. $f(x) = \frac{x^3 + x^2 - 44.0x - 84.0}{x^3 - 13.0x - 12.0}$
- D. $f(x) = \frac{x^3 - 4.0x^2 - 19.0x - 14.0}{x^3 - 13.0x - 12.0}$
- E. None of the above are possible equations for the graph.

2. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{12x^3 - 41x^2 + 44x - 15}{4x^2 + 9x - 9}$$

- A. Horizontal Asymptote of $y = -3.0$ and Oblique Asymptote of $y = 3x - 17$
- B. Horizontal Asymptote of $y = 3.0$
- C. Oblique Asymptote of $y = 3x - 17$.
- D. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x - 17$
- E. Horizontal Asymptote at $y = -3.0$

3. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{9x^3 + 9x^2 - 16x - 16}{12x^2 - 25x + 12}$$

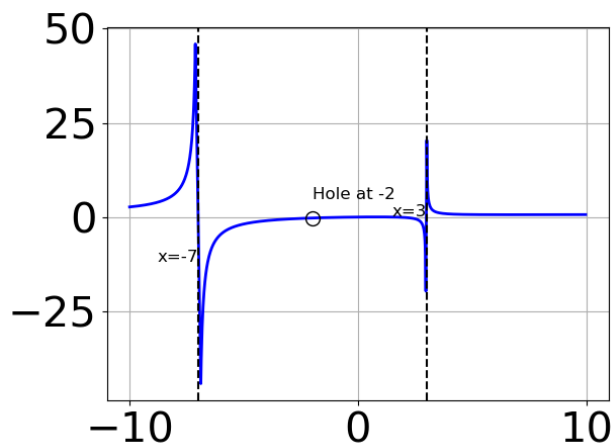
- A. Vertical Asymptote of $x = 0.75$ and hole at $x = 1.333$
 - B. Vertical Asymptotes of $x = 0.75$ and $x = -1.333$ with a hole at $x = 1.333$
 - C. Vertical Asymptotes of $x = 0.75$ and $x = 1.333$ with no holes.
 - D. Holes at $x = 0.75$ and $x = 1.333$ with no vertical asymptotes.
 - E. Vertical Asymptote of $x = 0.75$ and hole at $x = 1.333$
-

4. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^2 - 7x - 10}{18x^3 - 87x^2 + 35x + 100}$$

- A. Horizontal Asymptote of $y = 0.333$ and Oblique Asymptote of $y = 3x - 11$
 - B. Horizontal Asymptote of $y = 0.333$
 - C. Horizontal Asymptote of $y = 0$
 - D. Oblique Asymptote of $y = 3x - 11$.
 - E. Horizontal Asymptote at $y = 2.000$
-

5. Which of the following functions *could* be the graph below?



A. $f(x) = \frac{x^3 - 6.0x^2 + 3.0x + 10.0}{x^3 + 6.0x^2 - 13.0x - 42.0}$

B. $f(x) = \frac{x^3 - 1.0x^2 - 4.0x + 4.0}{x^3 - 6.0x^2 - 13.0x + 42.0}$

C. $f(x) = \frac{x^3 + x^2 - 4.0x - 4.0}{x^3 + 6.0x^2 - 13.0x - 42.0}$

D. $f(x) = \frac{x^3 - 2.0x^2 - 5.0x + 6.0}{x^3 - 6.0x^2 - 13.0x + 42.0}$

E. None of the above are possible equations for the graph.

6. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^2 - 7x - 10}{24x^3 + 74x^2 - 9x - 45}$$

A. Horizontal Asymptote at $y = 2.000$

B. Horizontal Asymptote of $y = 0.250$

C. Horizontal Asymptote of $y = 0.250$ and Oblique Asymptote of $y = 4x + 17$

D. Horizontal Asymptote of $y = 0$

E. Oblique Asymptote of $y = 4x + 17$.

7. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 - 43x^2 + 91x - 60}{9x^2 - 21x + 10}$$

- A. Vertical Asymptotes of $x = 0.667$ and $x = 1.5$ with a hole at $x = 1.667$
- B. Vertical Asymptote of $x = 0.667$ and hole at $x = 1.667$
- C. Vertical Asymptotes of $x = 0.667$ and $x = 1.667$ with no holes.
- D. Vertical Asymptote of $x = 0.667$ and hole at $x = 1.667$
- E. Holes at $x = 0.667$ and $x = 1.667$ with no vertical asymptotes.

8. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{8x^3 - 2x^2 - 43x + 30}{6x^2 + 11x - 10}$$

- A. Vertical Asymptote of $x = 1.333$ and hole at $x = -2.5$
- B. Vertical Asymptote of $x = 0.667$ and hole at $x = -2.5$
- C. Vertical Asymptotes of $x = 0.667$ and $x = -2.5$ with no holes.
- D. Vertical Asymptotes of $x = 0.667$ and $x = 0.75$ with a hole at $x = -2.5$
- E. Holes at $x = 0.667$ and $x = -2.5$ with no vertical asymptotes.

9. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 + 17x^2 - 3x - 20}{6x^2 + 11x - 10}$$

- A. Vertical Asymptote of $x = 0.667$ and hole at $x = -2.5$
- B. Vertical Asymptotes of $x = 0.667$ and $x = -2.5$ with no holes.
- C. Holes at $x = 0.667$ and $x = -2.5$ with no vertical asymptotes.
- D. Vertical Asymptote of $x = 1.0$ and hole at $x = -2.5$

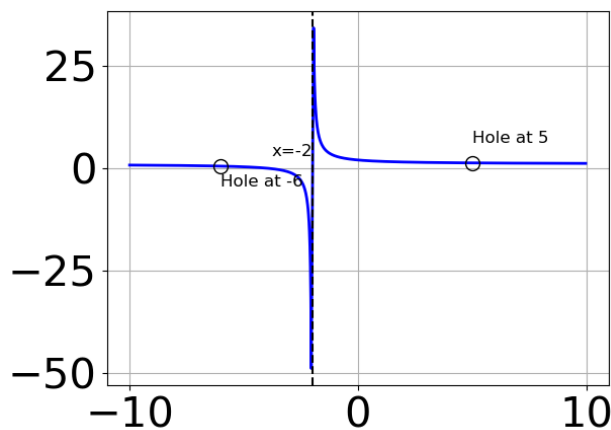
- E. Vertical Asymptotes of $x = 0.667$ and $x = -1.333$ with a hole at $x = -2.5$

10. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{9x^3 - 9x^2 - 46x - 24}{3x^2 + 16x + 16}$$

- A. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x - 19$
- B. Horizontal Asymptote of $y = 3.0$
- C. Oblique Asymptote of $y = 3x - 19$.
- D. Horizontal Asymptote of $y = -4.0$ and Oblique Asymptote of $y = 3x - 19$
- E. Horizontal Asymptote at $y = -4.0$

11. Which of the following functions *could* be the graph below?



- A. $f(x) = \frac{x^3 - 5.0x^2 - 26.0x + 120.0}{x^3 - 3.0x^2 - 28.0x + 60.0}$
- B. $f(x) = \frac{x^3 + 15.0x^2 + 72.0x + 112.0}{x^3 + 3.0x^2 - 28.0x - 60.0}$
- C. $f(x) = \frac{x^3 + 5.0x^2 - 26.0x - 120.0}{x^3 + 3.0x^2 - 28.0x - 60.0}$

D. $f(x) = \frac{x^3 - 6.0x^2 + 32.0}{x^3 - 3.0x^2 - 28.0x + 60.0}$

E. None of the above are possible equations for the graph.

12. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{12x^3 - 11x^2 - 45x + 50}{3x^2 - 14x + 15}$$

- A. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 4x + 15$
- B. Horizontal Asymptote at $y = 3.0$
- C. Horizontal Asymptote of $y = 4.0$ and Oblique Asymptote of $y = 4x + 15$
- D. Horizontal Asymptote of $y = 4.0$
- E. Oblique Asymptote of $y = 4x + 15$.
-

13. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 + 7x^2 - 56x + 48}{12x^2 - 25x + 12}$$

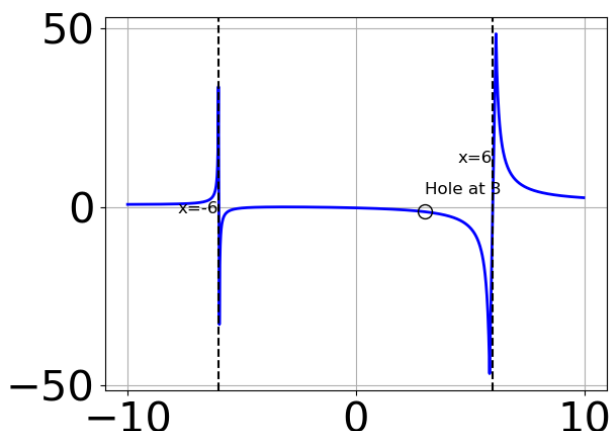
- A. Vertical Asymptote of $x = 0.5$ and hole at $x = 1.333$
- B. Vertical Asymptotes of $x = 0.75$ and $x = 1.5$ with a hole at $x = 1.333$
- C. Vertical Asymptotes of $x = 0.75$ and $x = 1.333$ with no holes.
- D. Vertical Asymptote of $x = 0.75$ and hole at $x = 1.333$
- E. Holes at $x = 0.75$ and $x = 1.333$ with no vertical asymptotes.
-

14. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{6x^2 - 17x + 10}{24x^3 - 38x^2 - 45x + 50}$$

- A. Horizontal Asymptote of $y = 0.250$ and Oblique Asymptote of $y = 4x + 5$
- B. Horizontal Asymptote of $y = 0.250$
- C. Oblique Asymptote of $y = 4x + 5$.
- D. Horizontal Asymptote at $y = 2.000$
- E. Horizontal Asymptote of $y = 0$

15. Which of the following functions *could* be the graph below?



- A. $f(x) = \frac{x^3 + 9.0x^2 + 26.0x + 24.0}{x^3 - 3.0x^2 - 36.0x + 108.0}$
- B. $f(x) = \frac{x^3 - 4.0x^2 - 4.0x + 16.0}{x^3 + 3.0x^2 - 36.0x - 108.0}$
- C. $f(x) = \frac{x^3 - 3.0x^2 - 10.0x + 24.0}{x^3 + 3.0x^2 - 36.0x - 108.0}$
- D. $f(x) = \frac{x^3 + 3.0x^2 - 10.0x - 24.0}{x^3 - 3.0x^2 - 36.0x + 108.0}$
- E. None of the above are possible equations for the graph.

16. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{4x^2 - 17x - 15}{24x^3 + 14x^2 - 23x - 15}$$

- A. Horizontal Asymptote of $y = 0$
 - B. Horizontal Asymptote of $y = 0.167$
 - C. Oblique Asymptote of $y = 6x + 29$.
 - D. Horizontal Asymptote of $y = 0.167$ and Oblique Asymptote of $y = 6x + 29$
 - E. Horizontal Asymptote at $y = 5.000$
-

17. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{16x^3 - 56x^2 - 47x + 60}{8x^2 - 18x + 9}$$

- A. Vertical Asymptote of $x = 1.5$ and hole at $x = 0.75$
 - B. Holes at $x = 1.5$ and $x = 0.75$ with no vertical asymptotes.
 - C. Vertical Asymptotes of $x = 1.5$ and $x = -1.25$ with a hole at $x = 0.75$
 - D. Vertical Asymptotes of $x = 1.5$ and $x = 0.75$ with no holes.
 - E. Vertical Asymptote of $x = 2.0$ and hole at $x = 0.75$
-

18. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{12x^3 + 37x^2 - 59x - 60}{12x^2 - 5x - 25}$$

- A. Holes at $x = -1.25$ and $x = 1.667$ with no vertical asymptotes.
- B. Vertical Asymptote of $x = 1.0$ and hole at $x = 1.667$

- C. Vertical Asymptote of $x = -1.25$ and hole at $x = 1.667$
 - D. Vertical Asymptotes of $x = -1.25$ and $x = -0.75$ with a hole at $x = 1.667$
 - E. Vertical Asymptotes of $x = -1.25$ and $x = 1.667$ with no holes.
-

19. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{8x^3 - 26x^2 - 33x + 36}{6x^2 + 19x + 15}$$

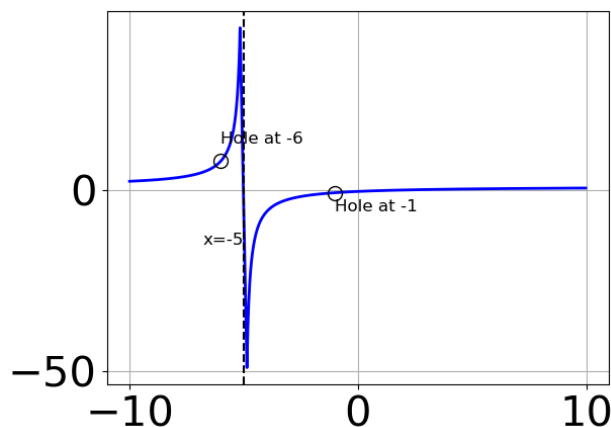
- A. Holes at $x = -1.667$ and $x = -1.5$ with no vertical asymptotes.
 - B. Vertical Asymptote of $x = 1.333$ and hole at $x = -1.5$
 - C. Vertical Asymptotes of $x = -1.667$ and $x = -1.5$ with no holes.
 - D. Vertical Asymptotes of $x = -1.667$ and $x = 0.75$ with a hole at $x = -1.5$
 - E. Vertical Asymptote of $x = -1.667$ and hole at $x = -1.5$
-

20. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{8x^3 - 10x^2 - 9x + 9}{2x^2 + 5x - 12}$$

- A. Horizontal Asymptote of $y = 4.0$
 - B. Oblique Asymptote of $y = 4x - 15$.
 - C. Horizontal Asymptote at $y = -4.0$
 - D. Horizontal Asymptote of $y = -4.0$ and Oblique Asymptote of $y = 4x - 15$
 - E. Horizontal Asymptote of $y = 4.0$ and Oblique Asymptote of $y = 4x - 15$
-

21. Which of the following functions *could* be the graph below?



- A. $f(x) = \frac{x^3 + 7.0x^2 + 14.0x + 8.0}{x^3 - 12.0x^2 + 41.0x - 30.0}$
- B. $f(x) = \frac{x^3 - 9.0x^2 + 20.0x - 12.0}{x^3 + 12.0x^2 + 41.0x + 30.0}$
- C. $f(x) = \frac{x^3 + 5.0x^2 - 8.0x - 12.0}{x^3 + 12.0x^2 + 41.0x + 30.0}$
- D. $f(x) = \frac{x^3 - 5.0x^2 - 8.0x + 12.0}{x^3 - 12.0x^2 + 41.0x - 30.0}$
- E. None of the above are possible equations for the graph.

22. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{9x^3 - 39x^2 + 52x - 20}{3x^2 - 14x + 15}$$

- A. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x + 1$
- B. Horizontal Asymptote of $y = 3.0$
- C. Horizontal Asymptote of $y = 3.0$ and Oblique Asymptote of $y = 3x + 1$
- D. Horizontal Asymptote at $y = 3.0$
- E. Oblique Asymptote of $y = 3x + 1$.

23. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{12x^3 - 7x^2 - 72x - 45}{6x^2 - 5x - 25}$$

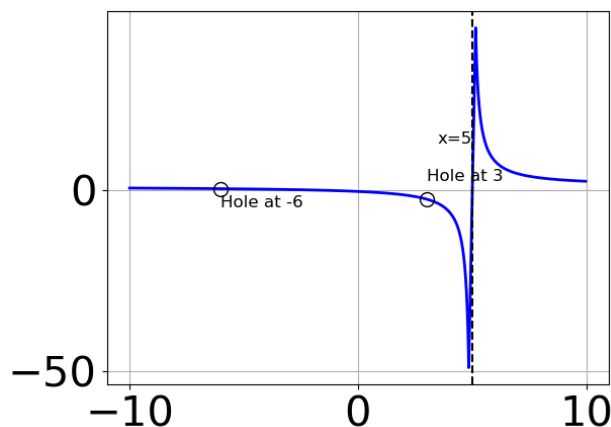
- A. Vertical Asymptotes of $x = 2.5$ and $x = -0.75$ with a hole at $x = -1.667$
 - B. Vertical Asymptotes of $x = 2.5$ and $x = -1.667$ with no holes.
 - C. Vertical Asymptote of $x = 2.0$ and hole at $x = -1.667$
 - D. Holes at $x = 2.5$ and $x = -1.667$ with no vertical asymptotes.
 - E. Vertical Asymptote of $x = 2.5$ and hole at $x = -1.667$
-

24. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{3x^2 + 11x - 20}{9x^3 - 63x^2 + 128x - 80}$$

- A. Oblique Asymptote of $y = 3x - 32$.
 - B. Horizontal Asymptote at $y = -5.000$
 - C. Horizontal Asymptote of $y = 0.333$
 - D. Horizontal Asymptote of $y = 0.333$ and Oblique Asymptote of $y = 3x - 32$
 - E. Horizontal Asymptote of $y = 0$
-

25. Which of the following functions *could* be the graph below?



- A. $f(x) = \frac{x^3 + 5.0x^2 - 12.0x - 36.0}{x^3 - 2.0x^2 - 33.0x + 90.0}$
- B. $f(x) = \frac{x^3 - 4.0x^2 - 4.0x + 16.0}{x^3 + 2.0x^2 - 33.0x - 90.0}$
- C. $f(x) = \frac{x^3 + 6.0x^2 + 3.0x - 10.0}{x^3 - 2.0x^2 - 33.0x + 90.0}$
- D. $f(x) = \frac{x^3 - 5.0x^2 - 12.0x + 36.0}{x^3 + 2.0x^2 - 33.0x - 90.0}$
- E. None of the above are possible equations for the graph.

26. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{4x^2 + 17x - 15}{20x^3 + 49x^2 - 112x + 48}$$

- A. Horizontal Asymptote at $y = -5.000$
- B. Horizontal Asymptote of $y = 0$
- C. Oblique Asymptote of $y = 5x - 9$.
- D. Horizontal Asymptote of $y = 0.200$ and Oblique Asymptote of $y = 5x - 9$
- E. Horizontal Asymptote of $y = 0.200$

27. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{12x^3 - 19x^2 - 45x - 18}{12x^2 + 25x + 12}$$

- A. Vertical Asymptotes of $x = -1.333$ and $x = -0.667$ with a hole at $x = -0.75$
- B. Vertical Asymptotes of $x = -1.333$ and $x = -0.75$ with no holes.
- C. Vertical Asymptote of $x = -1.333$ and hole at $x = -0.75$
- D. Holes at $x = -1.333$ and $x = -0.75$ with no vertical asymptotes.
- E. Vertical Asymptote of $x = 1.0$ and hole at $x = -0.75$

28. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{4x^3 - 12x^2 - 7x + 30}{6x^2 - 11x - 10}$$

- A. Vertical Asymptotes of $x = -0.667$ and $x = 2.5$ with no holes.
- B. Vertical Asymptotes of $x = -0.667$ and $x = -1.5$ with a hole at $x = 2.5$
- C. Vertical Asymptote of $x = -0.667$ and hole at $x = 2.5$
- D. Vertical Asymptote of $x = 0.667$ and hole at $x = 2.5$
- E. Holes at $x = -0.667$ and $x = 2.5$ with no vertical asymptotes.

29. Determine the vertical asymptotes and holes in the rational function below.

$$f(x) = \frac{6x^3 + 23x^2 - 10x - 75}{4x^2 + 16x + 15}$$

- A. Vertical Asymptotes of $x = -1.5$ and $x = -2.5$ with no holes.
- B. Holes at $x = -1.5$ and $x = -2.5$ with no vertical asymptotes.
- C. Vertical Asymptotes of $x = -1.5$ and $x = 1.667$ with a hole at $x = -2.5$

- D. Vertical Asymptote of $x = 1.5$ and hole at $x = -2.5$
 - E. Vertical Asymptote of $x = -1.5$ and hole at $x = -2.5$
-

30. Determine the horizontal and/or oblique asymptotes in the rational function below.

$$f(x) = \frac{8x^3 + 26x^2 - 5x - 50}{4x^2 - 25x + 25}$$

- A. Horizontal Asymptote at $y = 5.0$
 - B. Horizontal Asymptote of $y = 2.0$
 - C. Horizontal Asymptote of $y = 2.0$ and Oblique Asymptote of $y = 2x + 19$
 - D. Horizontal Asymptote of $y = 5.0$ and Oblique Asymptote of $y = 2x + 19$
 - E. Oblique Asymptote of $y = 2x + 19$.
-